

# NASA SBIR/STTR Technologies

## S20.01-9000 - GNSS Reflectometer Instrument for Bi-static Synthetic Aperture Radar (GRIBSAR) Measurements of Earth Science Parameters



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### Identification and Significance of Innovation

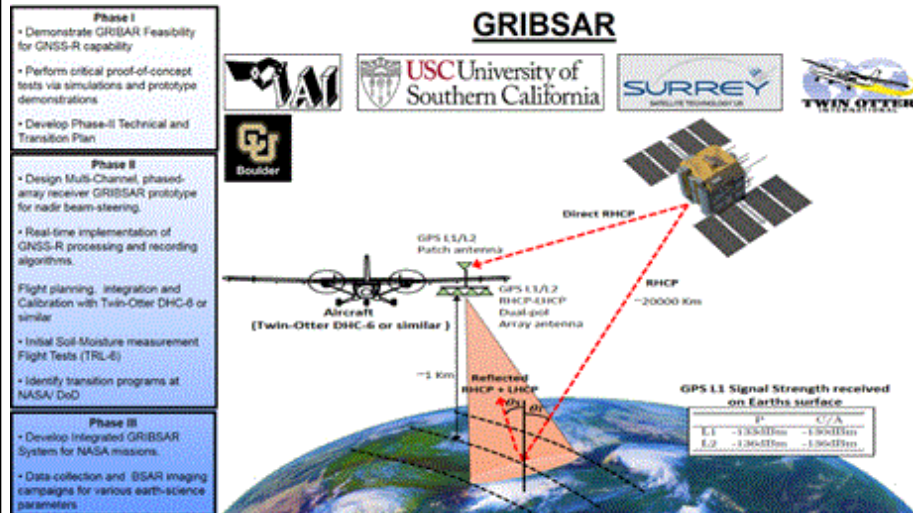
Global Navigation Satellite System (GNSS) signals scattered from ocean, land and ice are affected by the reflecting surface, and hence the changes induced by the surface can be observed. The full-time operation of radio navigation satellites system, abundant global signal coverage and spread spectrum communication for flexible signal processing makes GNSS reflected signals a viable candidate for Signal-Of-Opportunity (SOO) passive sensing. Existing research has shown that GNSS-Reflectometry (GNSS-R) based remote sensing has the potential to give environmental scientists a low-cost, wide-coverage measurement network that will greatly increase our knowledge of the Earth's environmental processes. The Intelligent Automation, Inc. (IAI) team proposes to develop a GNSS Reflectometer Instrument for Bistatic Synthetic Aperture Radar (GRIBSAR) for measuring earth science parameters. Our proposed approach is modular, scalable and meets the NASA goals of multi-channel, GNSS-R system to exploit GNSS reflected signals as SOO.

Estimated TRL at beginning and end of contract: ( Begin: 3 End: 6 )

### Technical Objectives and Work Plan

The overall Phase II objective will be to design the complete GRIBSAR system consisting of multiple coherent GNSS Receivers, array antenna mounted on top and bottom of the DHC-6 aircraft fuselage and the GPC software/firmware. This system will be flown on the DHC-6 aircraft for calibration and soil-moisture science measurements. The specific objectives are:

- Objective 1- GRIBSAR Instrument and Antenna Design
- Objective 2- Develop GPC Software/ Firmware
- Objective 3- GRIBSAR Hardware-Software Validation
- Objective 4- GRIBSAR Flight-Testing



### NASA Applications

NASA/ Government applications are:

- Multi-Channel direction finding receivers
- Algorithm development platform.
- Phased-Array Passive Radar receivers.
- Ocean altimetry, measurement of ocean roughness and Sea-Ice monitoring.
- Multi-Channel, real-time, waveform recorders

### Non-NASA Applications

Non-NASA commercial applications are:

- Real-time digital processors.
- Multi-node Network emulators
- Passive direction-finding and asset tracking

### Firm Contacts

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NON-PROPRIETARY DATA